PROCESS FOR THE REMOVAL IN A SMALL VOLUME OF LIQUID SAMPLES PLACED IN CONTAINERS AND DEVICE FOR THE PRACTICAL APPLICATION OF THE PROCESS

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ABSTRACT OF THE DISCLOSURE

Small volumes of contaminated liquids in polythene containers are supplied by a compressed air conduit to a lead shielded enclosure where the containers and contents are frozen, then crushed and the fragments then heated, washed, conditioned and discharged from the enclosure.

The present invention relates to the removal, in a small volume, of samples of noxious solutions which are placed in containers.

The invention is more especially concerned with the removal of samples of radioactive solutions after these latter have been analyzed in a pilot plant, said samples being, for example, placed within flasks of polythene which are in turn enclosed within capped transporter tubes which are also formed of polythene, said transporter tubes being employed for transferring samples from the flasks to the laboratories, then from the laboratories to a decommissioning plant for conditioning and subsequent removal.

When the analyses to be performed have been completed, the sample flasks must be opened and their contents removed. Since the rubber plug which closes each sample flask is secured by means of an aluminium capsule which is crimped on for reasons of safety, the flasks can be emptied only by means of a mechanical process which consists either in removing the caps, in splitting open the flasks or in an unclamping operation.

When the flasks are to be handled, it is necessary to ensure that the interior of the flasks is free of liquid, which is not possible if the liquid is allowed to remain undisturbed, thereby sealing the flasks.

In order to prevent said containers from being contaminated, the active liquids being frozen at the time of cracking, improvement of decontamination by elimination of internal corners of flasks which are always difficult to clean, small storage volume which is reduced in the proportion of 4 to 1.

A clearer understanding of the present invention will in any case be gained from the accompanying drawings which follows below as well as from the accompanying drawings, it being understood that said description and drawings are given solely by way of indication and not in any limiting sense.

In the accompanying drawings:

FIG. 1 is a vertical section view along line a—a of FIG. 2 and showing a device in accordance with the invention.

FIG. 2 is a vertical sectional view along line b—b of FIG. 1, with a fragmentary sectional view of the crusher.

The foil containers such as the container 3 are admitted at 4 at the top of the enclosure 1 and are directed by means of an inclined ramp 5 towards a cooler 6 in which they remain for a certain length of time. Liquid nitrogen which is circulated through said cooler is admitted through the tube 7 and discharged through the tube 8 and maintains as a result of the evaporation thereof a temperature of approximately —150° C. within the cooler.

After passing out of the cooler, the containers formed of polythene which has thus been embrittlement is directed toward the crusher provided with two series of discs such as 10 which are designed to crush all the containers and reduce them to small fragments. The discs such as the disc 10 are driven in rotation by a motor 11 through the intermediary of a driving belt 12, a flywheel 13 and a shaft 14 which passes
through the shield 2 and the enclosure 1 in leak-tight manner by virtue of seals 15, 16 and 17. The crushed fragments fall through a funnel 18 placed beneath the crusher 9 into a washing tank 19 in which the liquid effluents are then separated from the solid wastes. Three water-supply pipes such as the pipe 20 and solid-supply pipes such as the pipes 21 and 22 terminate within the top portion of said tank 19 and, as will be apparent, also pass through the enclosure 1 in leak-tight manner. Compressed air is injected at 23 into the bottom outlet of the tank 19 so as to complete the washing of the crushed containers by agitation. The liquid effluents will be discharged through the pipe 24 which is fitted with a filter cock 25. The solid wastes, which are considerably reduced in volume, will be discharged through a conduit 27 by means of compressed air which is admitted through an intake 26.

There can also be disposed within the interior of the enclosure 1 a capping device 28 and a container lift 29 which will serve for emergency operation in the event of failure in the normal supply of containers at 4.

Provision can finally be made in the enclosure 1 for an access door 30 which is actuated by a jack 31, viewing windows such as the window 32, a lock chamber 33, a passageway 34 providing access to the crusher, a handling grab 35 which is mounted on a universal joint assembly 36, a device for providing ventilation through the openings 37, as well as lighting means and all other conventional arrangements which may prove necessary.

As will be readily understood, and as has in any case been brought out in the foregoing, the present invention is not limited in any sense to the example of construction or to the mode of application which have been more especially described and illustrated but is intended, on the contrary, to include within its scope all alternative forms, particularly in regard to the removal of any liquid samples of a hazardous but not necessarily radioactive nature which are placed in containers.

What we claim is:
1. Process for the removal in small volume of samples of noxious liquid solutions in containers, the steps of cooling the liquid samples and their contaminated containers to a temperature at which the containers are embrittled and the liquids therein are frozen, then crushing the containers and frozen liquid samples therein and then heating, washing, conditioning and discharging the crushed fragments in a storage drum.
2. Process as described in claim 1, said containers being polythene.
3. Process as described in claim 1, said containers being cooled to a temperature of approximately -150° C.
4. A device for carrying out the process of claim 1 comprising a compressed air conduit for the supply of containers, and inclined ramp connected to said conduit, a cooler through which liquid nitrogen is circulated receiving containers from said ramp, a crusher receiving containers from said cooler, a washing tank receiving fragments from said crusher, means for conditioning solid wastes from said washing tank, means for discharging solid wastes and liquid effluents from said containing means, said device being disposed within a steel walled, leak tight, lead shielded enclosure and viewing windows, handling grabs, access doors, lock chambers and lighting means for said enclosure.
5. A device as described in claim 4 including lifting apparatus in said enclosure for emergency operation on failure of normal supply of containers.

No references cited.

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